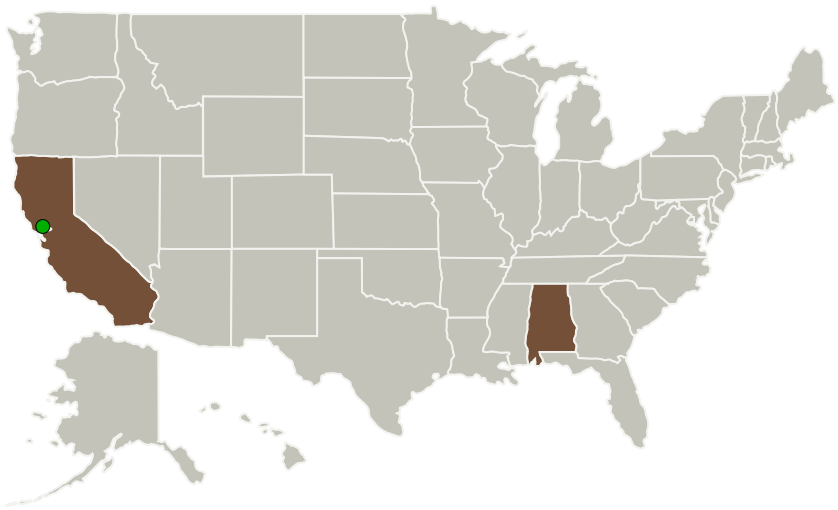
Rad-hard Location and Attitude Module (R-LAM), Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

R-LAM (Rad-hard Location and Attitude Module), promises a new generation of both integrated navigation modules and stand-alone navigation subsystems including nav-grade IMU's, atomic-precision clocks and GPS units compliant with the Space Plug and Play Architecture (SPA) initiative. R-LAM leverages two active DARPA MTO programs. In the Navigation-Grade Integrated Micro-Gyroscope (NG-IMG) project, Archangel Systems, Inc. has developed a MEMS IMU called NG-MARS - a spinning mass IMU with navigation-grade performance. In DARPA's Chip-Scale Atomic Clock (CSAC) program, Symmetricom, Inc has developed a clock that is 50-100X smaller and lower power than any previous atomic clock technology, while exhibiting short-term stability of □y(τ) < 1x10-10/□1/2 and long-term drift of < 3 x 10-10/month. NASA-Goddard has constructed a rad-hard GPS called Navigator for the Magnetospheric Multiscale (MMS) program. Designed for high elliptical orbits (HEO), Navigator uses NASA's Geon algorithms. Currently Navigator weight and power exceeds R-LAM requirements. NASA-Goddard colleagues will advise the R-LAM team as they transition Navigator hardware. Intrinsix Corp. is an ASIC design house skilled in rad-hard mixed-signal design. They will implement rad-hard support electronics for NG-MARS, CSAC and Navigator. Intrinsix is familiar with NASA's SPA initiatives and will design the R-LAM interface for compliance.

Primary U.S. Work Locations and Key Partners



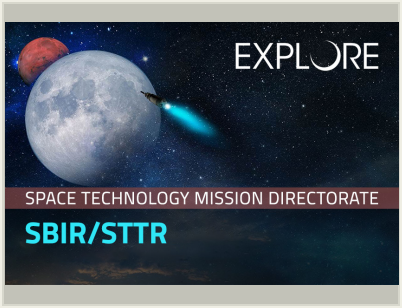


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Table of Contents

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Organizations Performing Work	Role	Type	Location
Archangel Systems	Lead Organization	Industry	Auburn, Alabama
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
Alabama	California

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139361)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Archangel Systems

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

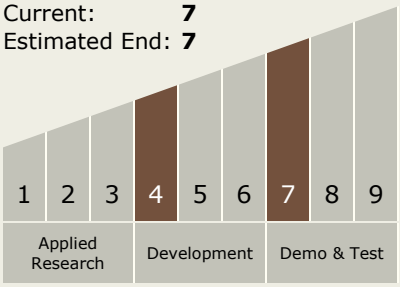
Carlos Torrez

Principal Investigator:

William C Dillard

Technology Maturity (TRL)

Start: **4**
Current: **7**
Estimated End: **7**



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Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.4 Network Provided Position, Navigation, and Timing
    - TX05.4.1 Timekeeping and Time Distribution

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System